

Pauropoda (Myriapoda) from Vietnam (Pauropoda and Symphyla of the Geneva Museum XIII)

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Pauropoda (Myriapoda) from Vietnam (Pauropoda and Symphyla of the Geneva Museum XIII). - Eight species of Pauropoda are reported from and near limestone hills in south Vietnam. Seven species from four genera are new to science and are described here: *Allopauropus* (D.) *leptotarsus* sp. n., *A. (D.) linguatulus* sp. n., *A. (D.) barbatulus* sp. n., *A. (D.) absimilis* sp. n., *Pauropus asiaticus* sp. n., *Samarangopus campanulatus* sp. n. and *Sphaeropauropus lecongkietii* sp. n.

Key-words: Myriapoda - Pauropoda - taxonomy - new species - Vietnam - biogeography - soil fauna - limestone.

INTRODUCTION AND BACKGROUND

As far as I know only one pauropod species has previously been recorded from Vietnam, viz. *Pauropus dawydoffi* Remy. A single specimen was reported (Remy, 1933) from central Vietnam (Dalat, in the tableland Lang Giang, alt. 1500 m a.s.). The species has not been found again either in Vietnam or elsewhere.

The ecosystem of the limestone hills in the Hon Chong area is seriously threatened by irreversible damages caused by intensive limestone exploitation linked to the recent development of large cement plants. Though these hills and their fauna and flora certainly have a biological originality of high value they were till recently virtually unknown to science. The first results of a soil and cave fauna survey have shown that several endemic species of Collembola and Coleoptera are living there (Deuve, 1996; Deharveng & Bedos, 1995, 1996; Bedos & Deharveng, 2000).

Now data on Pauropoda can be added. Though it was not the primary aim of collecting to obtain pauropods, Drs Deharveng's and Bedos' material is of greatest value. The present study shows that the pauropods too have developed several endemic species there. Among 8 species reported, no less than 7 are new to science and one can hardly believe that they have a much wider distribution outside the area of these limestone hills. No comparable ecosystems exist neither in the neighbourhood nor elsewhere in Vietnam, where the next significant karstic area is located 750 km north-east of Hon Chong. Scattered limestone hills of the same type can be found 30-40 km further north near the border in Ha Tien and in Cambodia (near Kompong Trach). Calcareous areas with similar climatic conditions also exist in Thailand, but they are

lying in a different geographic area and support a largely different wildlife. The Hon Chong limestone hills are small and isolated, and evidence is growing that their litter and soil fauna contains endemic taxa of great interest.

MATERIAL

In 1995, 2000 and 2001 Drs Louis Deharveng and Anne Bedos, Université Paul Sabatier, Toulouse (now Muséum National d'Histoire Naturelle, Paris), assisted by Professor Le Cong Kiet from the University of Ho Chi Minh City (Department of Botany and Ecology), made Berlese extractions of litter and soil samples in south-western Vietnam. Their interest was focused on the Ha Tien – Hon Chong limestone hills in the Kien Giang Province. From the collected material 45 specimens of Pauropoda were sorted out, among which 8 species could be identified, 7 of them as new to science. 5 species belong to the Pauropodidae (genera *Allopaupopus* and *Pauropus*) and 3 species to the Eurypauropodidae (genera *Samarangopus* and *Sphaeropauropus*). The species new to science are described below: *Allopaupopus* (D.) *leptotarsus* sp. n., *A. (D.) linguatulus* sp. n., *A. (D.) barbatulus* sp. n., *A. (D.) absimilis* sp. n., *Pauropus asiaticus* sp. n., *Samarangopus campanulatus* sp. n. and *Sphaeropauropus lecongkieti* sp. n.

Unless stated otherwise, all material was collected by Drs Louis Deharveng and Anne Bedos. The material is deposited in the collections of the Department of Arthropods and Entomology I, Natural History Museum of Geneva.

ABBREVIATIONS AND MEASUREMENTS

Abbreviations: ad. ..., subad. ... and juv. ... = an adult, a subadult or a juvenile specimen with the number of pairs of legs indicated.

Measurements: length of the body in mm and range of variation in adult paratypes given in brackets. Indication of absolute lengths are generally used only in the description of Eurypauropodidae and always applicated with μm . Otherwise the text refer the reader to relative lengths.

SYSTEMATICS

Order TETRAMEROCERATA

PAUROPODIDAE

One described species in the Pauropodidae, *Pauropus dawydoffi* Remy, was previously known from Vietnam (Remy, 1933). Five additional species, all new to science, with a total of 19 specimens, are here added. The high number of undescribed species in comparison with the low number of collected specimens indicates a very diversified fauna. These 6 species belong to the genera *Allopaupopus* and *Pauropus*, 2 of the most widespread genera in Pauropoda. Future collecting will certainly increase considerably the number of species in these genera, particularly in *Allopaupopus*, but I suppose that not only many species will be discovered there, but also some additional genera to the list of Vietnam, e.g. *Scleropauropus*, *Stylopauropus*, *Hemipauropus*, *Rabaudaupopus*, *Cauvetauropus*. Thus, those 6 species now known from Vietnam are only a small part of an expected rich fauna of Pauropodidae.

In the studied collection another Pauropodidae species was found, which, however, could not be described. A single ad. 9(♂), of a species close to *Allopauropus* (*D.*) *chichinii* Remy, was collected from a limestone hill at Mo So near Hon Chong.

Genus *Allopauropus* Silvestri, 1902

Subgenus *Decapauropus* Remy, 1957 (Remy, 1957a)

1. *Allopauropus* (*D.*) *leptotarsus* sp. n.

Figs 1-11

Type material. Holotype: ad. 9(♀), VIETNAM, Ken Giang Province, Kien Luong, Hon Chong, Nui Binh Tri, secondary forest, Berlese extraction, 19.I.2000 (Loc. VIET-861). *Paratypes:* 2 ad. 9(♀), same data as holotype (Loc. VIET-858).

Other material. VIETNAM, Ken Giang Province, Kien Luong, Hon Chong, Nui Son Cha, under bush on limestone, litter, Berlese extraction, 1 ad. 9(♀), 18.I.2000 (Loc. VIET-840).

Total number. 4 specimens.

Diagnosis. *A. (D.) leptotarsus* sp. n. is well delimited from all other species of *Decapauropus* by the following combination of distinctive characters: anal plate rhombic, with two straight parallel posterior appendages close to each other; pygidial tergum subrectangular, with a small median lobe above anal plate; tarsi of posterior legs very slender and setae of the pygidial tergum long, pointed, glabrous and directed posteriorly. From the above characters *A. (D.) leptotarsus* sp. n. seems to be close to species in the subgenus *Allopauropus* s. str., but the absence of the pygidial setae b_3 assigns it to the subgenus *Decapauropus*.

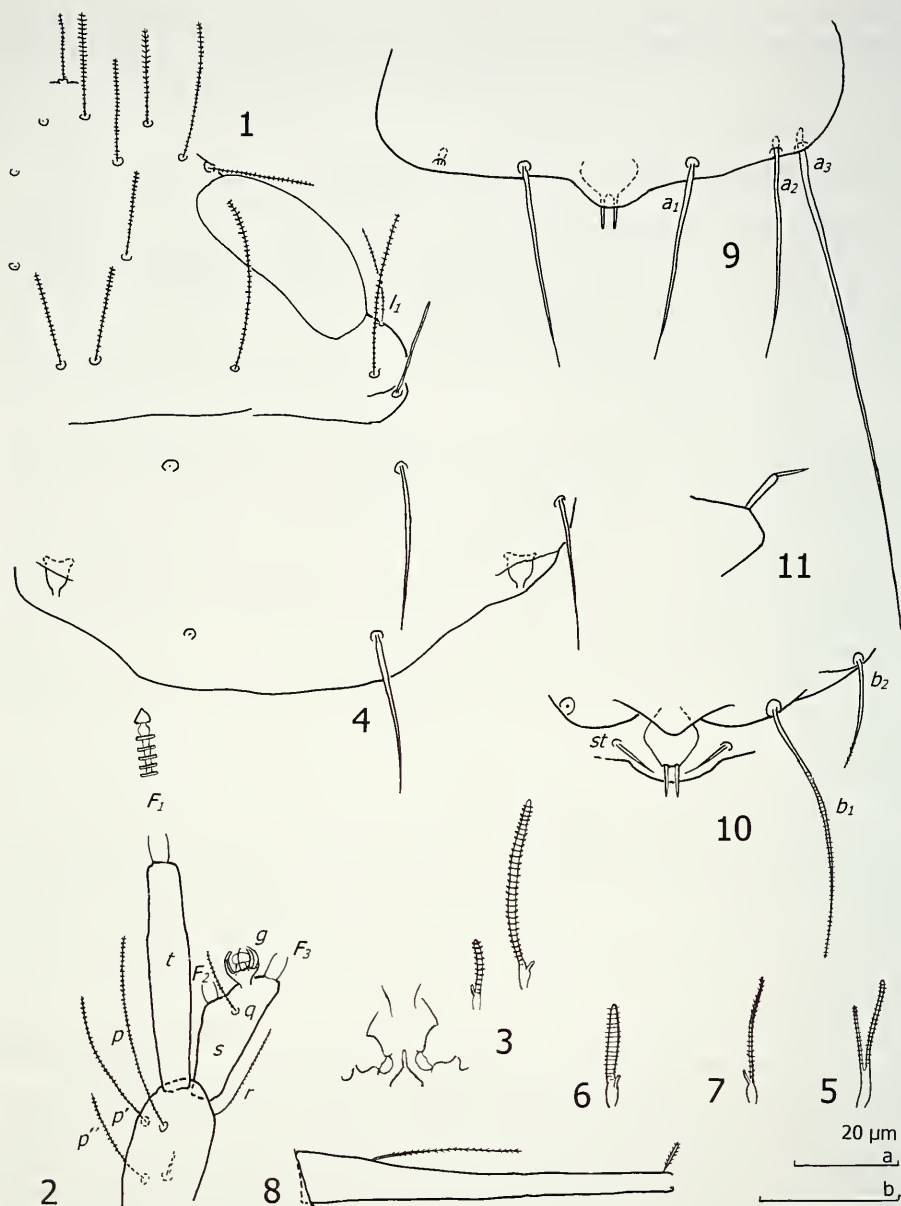
Etymology. From Greek leptos = thin, fine, slender (referring to the tarsi of the last pair of legs).

DESCRIPTION

Length. (0.88-) 0.92(-0.94) mm.

Head. Tergal setae mostly lacking, those present showing thin cylindrical or subcylindrical setae of medium length or fairly long ones. Relative lengths of setae (paratype specimen), 1st row: $a_1 = 10$, $a_2 = 9$; 2nd row: $a_1 = 10$, $a_2 = 13$, $a_3 = 11$; 3rd row: $a_1 = 9$, $a_2 = ?$; 4th row: $a_1 = a_4 = 10$, $a_2 = a_3 = 17$; lateral group of setae: $l_1 = l_3 = 15$, $l_2 = ?$. Length of temporal organs somewhat shorter than shortest interdistance. Head cuticle glabrous.

Antennae. Segment 4 with 5 setae, all thin, cylindrical, distally tapering, densely striate. Relative lengths of setae: $p = 100$, $p' = (67-73(-75))$, $p'' = (48-50(-52))$, $p''' = (12-13)$, $r = (13-14)$. Tergal branch t thin, slender, (5.2-)6.0(-6.1) times as long as greatest diameter and (1.3-)1.6(-1.7) times as long as sternal branch s , which is 2.2(-3.1) times as long as its greatest diameter; anterior corner strongly truncate. Seta q similar to seta r of 4th segment, with high insertion point, almost straight, (0.5-)0.6 of length of s . Relative lengths of flagella (base segments included) and base segments alone: $F_1 = 100$, $bs_1 = 4$; $F_2 = 30(-33)$, $bs_2 = 2$; $F_3 = (78-80(-81))$, $bs_3 = 4$. F_1 3.4(-3.5) times as long as t , F_2 and F_3 1.1(-1.2) and (2.9-)3.0(-3.1) times as long as s respectively. Distal calyces of F_1 conical, those of F_2 and F_3 very small and not examined in detail. Distal part of flagella axes somewhat widened but only just below calyx. Globulus g only very little longer than wide, capsule flattened; width of g 0.8 of greatest diameter of t . Antennae glabrous.



FIGS 1-11

Allopauropus (D.) leptotarsus sp. n., holotype, ad. 9(♀). 1, head, median and right part, tergal view; 2, right antenna, tergal view; 3, collum segment, median and left part, sternal view; 4, tergite VI, posterior part; 5, seta on coxa of leg 9; 6, seta on coxa of leg 8; 7, seta on trochanter of leg 8; 8, tarsus of leg 9; 9, pygidial tergum, tergal view; 10, pygidium, posteromedian part, sternal view; 11, anal plate, lateral view. Scale a: Figs 4-8; b: Figs 1-3, 9-11.

Trunk. Setae of collum segment furcate. Primary branch thick, cylindrical, densely annulate; secondary branch rudimentary and glabrous. Sublateral seta 2.7(-2.8) times as long as submedian one; sternite process in anterior part very narrowly rod-shaped and without apical incision. Appendages much wider in proximal than in distal half, distal caps hemispherical. Process and appendages glabrous.

Setae on tergite I as on head, on II similar but somewhat tapering, on VI pointed and glabrous. 4+4 setae on tergite I, 6+6 on II-IV, 6+4 on V and 4+2 on VI. Submedian posterior setae on tergite VI (0.8-)0.9 of their interdistance.

Bothriotricha. Relative lengths of bothriotricha: $T_1 = 100$, $T_2 = (110-)\text{113}(-\text{114})$, $T_3 = \text{108}(-\text{119})$, $T_4 = ?(\text{124}-\text{128})$, $T_5 = \text{168}(-\text{181})$. Axes thin, simple, straight, those of T_3 only a little thicker than the others. Pubescence very short depressed-oblique.

Legs. Setae on coxa and trochanter of leg 9 similar to each other, furcate, branches cylindrical, striate, blunt; secondary branch somewhat shorter than primary one. These setae on legs 1-8 with rudimentary glabrous secondary branches, setae on coxa thicker than those on trochanter. Tarsus of leg 9 very slender, (6.2-)7.3(-7.4) times as long as greatest diameter, distal half subcylindrical. Proximal seta thin, pointed, with short oblique pubescence, its length 0.4 of length of tarsus and (4.0-)4.3 times as long as distal seta; the latter cylindrical, blunt, with short oblique pubescence. Cuticle of tarsus almost glabrous.

Pygidium. Tergum. Almost rectangular with small semicircular lobe between *st* just above anal plate. Relative lengths of setae: $a_1 = 10$, $a_2 = (10-)\text{11}$, $a_3 = (22-)\text{24}$, *st* = 2(-3). All these setae almost straight, tapering, pointed, glabrous; a_1 and a_2 somewhat converging, a_3 somewhat diverging, *st* strongly converging. Distance $a_1 - a_1$ 0.8 of length of a_1 ; distance $a_1 - a_2$ 3.0 times longer than distance $a_2 - a_3$; distance *st* - *st* 2.3(-2.4) times as long as *st* and 0.7 of distance $a_1 - a_1$. Cuticle glabrous.

Sternum. Posterior margin between b_1 indented and with a broad triangular lobe projecting backwards below anal plate. Relative lengths of setae ($a_1 = 10$): $b_1 = \text{12}(-\text{13})$, $b_2 = 5$. These setae thin, tapering, distally striate; b_1 (1.2-)1.3 times as long as interdistance, b_2 1.1 times as long as distance $b_1 - b_2$.

Anal plate directed upwards-backwards, rhombic, somewhat longer than wide, lateral corners rounded, 2 thin posteromedian, parallel appendages close to each other. The latter tapering, directed posteriorly, their length 0.7 of length of plate. Plate and appendages glabrous.

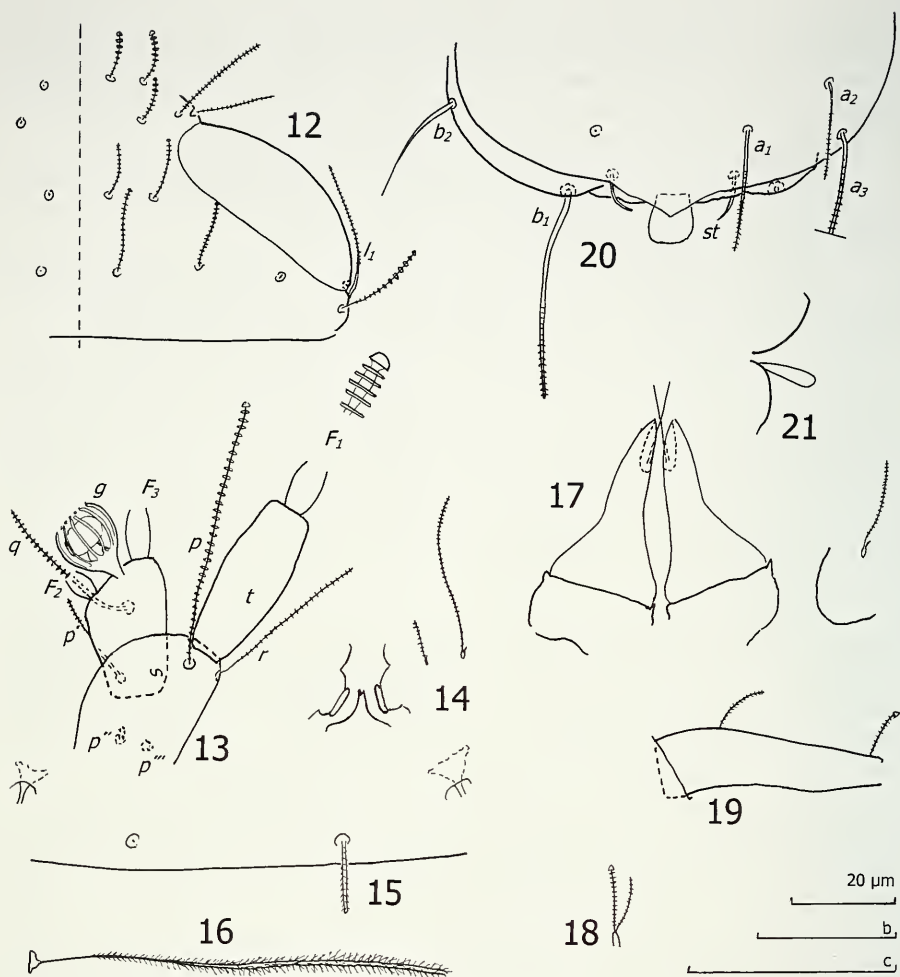
2. *Allopaupopus (D.) linguatulus* sp. n.

Figs 12-21

Type material. Holotype: ad. 9(♀), VIETNAM, Kien Giang Province, Kien Luong, Hon Chong, Nui Hang Tien, under bush on limestone, soil sample, Berlese extraction, 19.I.2000 (Loc. VIET-864). *Paratypes:* 3 ad. 9(1♂, 2♀), 1 juv. 3, same data as holotype. Kien Giang Province, Kien Luong, Hon Chong, Nui Son Cha, under limestone rock shelter, soil sample, Berlese extraction, 1 ad. 9(♂), 18.I.2001 (Loc. VIET-840).

Total number. 6 specimens.

Diagnosis. Only a few species in *Allopaupopus* have a linguiform anal plate without appendages. Among them, *A. linguatulus* sp. n. may be closest to *A. ligulosus* Hagino from Japan (Hagino, 1991), *A. andriai* Remy and *A. palifer* Remy, both from Madagascar (Remy, 1956a). Distinctive characters in relation to *A. ligulosus* are the shape of the bothriotricha (e.g. T_3 with thin subcylindrical axis in *A. linguatulus* sp. n.,



FIGS 12-21

Allopauropus (D.) linguatulus sp. n.: 12-16, 18-21, holotype, ad. 9(♀), 17, paratype, ad. 9(♂). 12, head, median and right part, tergal view; 13, right antenna, tergal view; 14, collum segment, median and left part, sternal view; 15, tergite VI, posteromedian part; 16, T_3 ; 17, genital papillae and seta on coxa of leg 2, anterior view; 18, seta on coxa of leg 9; 19, tarsus of leg 9; 20, pygidium, posterior part, tergal view; 21, anal plate, lateral view. Scale a: Fig. 16; b: Figs 12, 14, 15, 17-20; c: Figs 13, 21.

proximal 2/3 of axis club-shaped in *A. ligulosus*) and the *st* (thin and tapering in *A. linguatulus* sp. n., not clavate in *A. ligulosus*). *A. linguatulus* sp. n. is distinguished from *A. andriai* Remy by the shape of the bothriotrix T_3 (axis thin and tapering in *A. linguatulus* sp. n., with distal end widened in *A. andriai*) and by the dissimilar margins of the anal plate (glabrous, not with fringe of distinct pubescence hairs). The new species is well delimited from *A. palifer* Remy too.

The anal plate has a glabrous margin in *A. linguatulus* sp. n., but a fringe of distinct pubescence hairs in *A. palifer* and the *st* are thin and cylindrical, not clavate. Moreover is the shape of the setae a_1 on the pygidial tergum thin and tapering in *A. linguatulus* sp. n., and short and clavate in *A. palifer*.

Etymology. From Latin lingua = tongue (referring to the tongue-like shape of the anal plate).

DESCRIPTION

Length. (0.65-)0.89 mm.

Head. Tergal setae of medium length, median ones subcylindrical, annulate, blunt; a_3 in 2nd row and lateral group of setae striate, pointed. Relative lengths of setae, 1st row: $a_1 = 10$, $a_2 = 10(-11)$; 2nd row: $a_1 = 11$, $a_2 = 23(-25)$, $a_3 = 17(-20)$; 4th row: $a_1 = (13-)16$, $a_2 = 14(-19)$, $a_3 = ?(19)$, $a_4 = 17$; lateral group of setae: $l_1 = 27$, $l_2 = 20$, $l_3 = 19$. Temporal organs about 0.8 of shortest interdistance; small aperture at posterior margin. Head cuticle glabrous.

Antennae. Segment 4 with 5 setae, all but *r* and p''' subcylindrical, annulate; *r* straight, thin, cylindrical, striate; p''' a rudimentary knob only. Relative length of setae (paratype): $p = 100$, $p' = 36$, $p'' = 40$, $p''' = 1$, $r = 68$. Tergal branch *t* somewhat fusiform, (2.5-)2.6 times as long as greatest diameter and (1.0-)1.2 times as long as sternal branch *s*, which is 1.7(-1.8) times as long as greatest diameter; anterior corner distinctly truncate. Seta *q* cylindrical, annulate-striate, pointed, (1.1-)1.3(-1.5) times as long as *s*. Relative lengths of flagella (base segments included) and base segments alone: $F_1 = 100$, $bs_1 = 6$; $F_2 = 36(-37)$, $bs_2 = 4$; $F_3 = (85-)88$, $bs_3 = 6$. F_3 thinner than F_1 , F_2 thinner than F_3 . F_1 5.3 times as long as *t*, F_2 and F_3 (1.9-)2.3 and 4.7 times as long as *s*, respectively. Distal calyces somewhat flattened. Distal part of flagella axes only slightly widened. Globulus *g* 1.2(-1.3) times as long as greatest diameter, with (10-)11 bracts, capsule flattened; width of *g* 0.9(-1.0) of greatest diameter of *t*. Antennae glabrous.

Trunk. Setae of collum segment simple or with minute rudimentary secondary branch. Primary branch very thin, striate. Sublateral seta (3.3-)3.4 times as long as submedian one; sternite process anteriorly narrow, with small incision. Appendages obliquely conical, caps flat; process and appendages almost glabrous.

Tergal setae similar to median setae on tergal side of head; 4+4 setae on tergite I, 6+6 on II-IV, 6+4 on V and 4+2 on VI. Submedian posterior setae on VI almost 0.4 of their interdistance.

Bothriotricha. Relative lengths of bothriotricha: $T_1 = 100$, $T_2 = 83(-88)$, $T_3 = 117(-123)$, $T_4 = 126(-133)$, $T_5 = ?(193)$. Their axes thin, simple, straight, those of T_3 only a little thicker than the others. Pubescence almost erect, strongest on T_3 .

Genital papillae (paratype). Base wide, distally strongly tapering, distal half narrow, subcylindrical; they are 1.8 times as long as widest part, seta 0.4 of length of papilla. Seta on coxa of leg 2 similar to other coxal setae on anterior legs.

Legs. Setae on coxa and trochanter of leg 9 similar to each other, furcate, branches subcylindrical, striate-annulate, blunt; secondary branch somewhat shorter and thinner than primary one. These setae seem to be simple on legs 1-8 and without rudimentary secondary branch. Tarsus of leg 9 slender, tapering, somewhat curved,

(3.5-)3.7 times as long as greatest diameter. Proximal seta thin, cylindrical, striate, blunt, length 0.2(-0.3) of length of tarsus and 1.2(-1.3) times as long as distal seta; the latter cylindrical, striate, blunt. Cuticle of tarsus glabrous.

Pygidium. Tergum. Posterior margin rounded, with triangular lobe between *st* just above anal plate. Relative lengths of setae: $a_1 = 10$, $a_2 = 6$, $a_3 = ?(8-9)$, $st = 4(-5)$. a_1 , a_2 and a_3 almost straight, thin, tapering, striate distally; *st* glabrous, tapering, curved inwards and converging; a_2 thinnest and inserted almost straight anterior of a_3 . Distance $a_1 - a_1$ 0.9 of length of a_1 ; distance $a_1 - a_2$ twice longer than distance $a_2 - a_3$; distance *st* - *st* 2.6(-3.1) times as long as *st* and 0.8(-0.9) of distance $a_1 - a_1$. Cuticle glabrous.

Sternum. Posterior margin between b_1 with broad and low lobe below anal plate. Relative lengths of setae ($a_1 = 10$): $b_1 = 17(-18)$, $b_2 = 8(-9)$. These setae thin, tapering, striate distally. b_1 1.1(-1.2) times as long as their interdistance, b_2 0.8 of distance $b_1 - b_2$.

Anal plate directed backwards-downwards, narrowest anteriorly, linguiform, 1.1 times as long as wide, glabrous; no appendages.

3. *Allopauropus (D.) barbatulus* sp. n.

Figs 22-31

Type material: Holotype: ad. 9(♀), VIETNAM, Kien Giang Province, Kien Luong, Hon Chong, Nui Binh Tri, secondary forest in area without limestone, soil sample, Berlese extraction, 19.I.2000 (Loc. VIET-853).

Total number. 1 specimen.

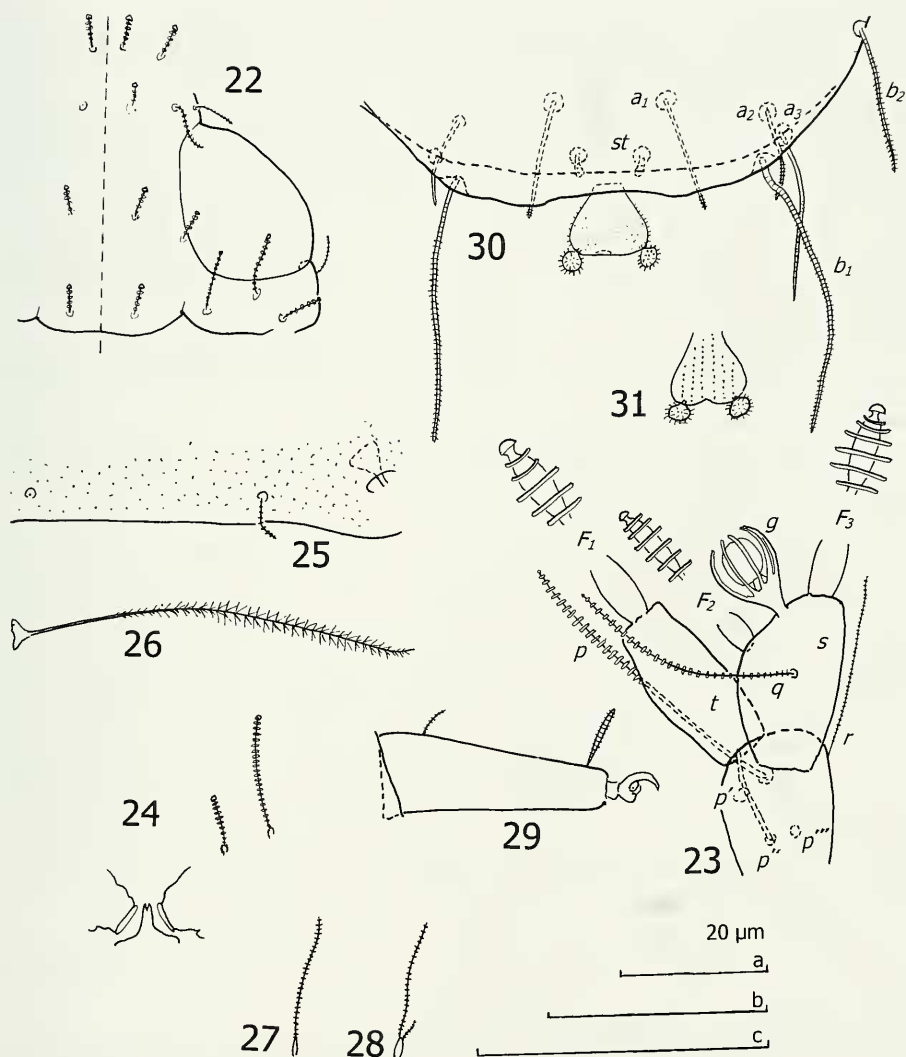
Diagnosis. *A. barbatulus* sp. n. is well defined by the following combination of characters: 1. anal plate almost cordate, with two short-stalked and ball-shaped appendages, one at each posterolateral corner; 2. distal seta on tarsus of leg 9 much longer than proximal seta; 3. pygidial tergum with thin subsimilar *a*-setae and short clavate *st*. This new species may be related to *A. rhopalophorus* Remy from Algeria (Remy, 1947) by the shape of the anal plate and some of the setae of the pygidial tergum. The two species are easily distinguishable by the shape of the pygidial setae a_1 (long and thin in *A. barbatulus* sp. n., short and blunt in *A. rhopalophorus* Remy) and by the shape of the appendages of the anal plate (ball-shaped and with short pubescence, versus not subcylindrical with a few long pubescence hairs only). More distant relationships presumably exist with the following species, e.g., *A. compatrueilis* Remy & Rollet from Madagascar (Remy & Rollet, 1960), *A. scitulus* Remy from Madagascar too (Remy, 1956a) and *A. chartoni* Remy from Réunion (Remy, 1956b).

Etymology. Diminutive of Latin *barbatus* = bearded (referring to the hairy anal plate).

DESCRIPTION

Length. 0.76 mm.

Head. Tergal setae short or of medium length. Relative lengths of setae, 1st row: $a_1 = 10$, $a_2 = 11$; 2nd row: $a_1 = 9$, $a_2 = 23$, $a_3 = 14$; 3rd row: $a_1 = 11$, $a_2 = 16$; 4th row: $a_1 = 11$, $a_2 = 22$, $a_3 = 26$, $a_4 = 20$. Lateral group of setae: $l_1 = 20$, l_2 and l_3 not studied. Temporal organs 1.2 times as long as their shortest interdistance; small aperture close to posterior margin. Head cuticle glabrous.



FIGS 22-31

Allopauropus (D.) *barbatulus* sp. n., holotype, ad. 9(♀). 22, head, median and right part, tergal view; 23, left antenna, sternal view; 24, collum segment, median and left part, sternal view; 25, tergite VI, right posterior part; 26, T_4 ; 27, seta on coxa of leg 9; 28, seta on trochanter of leg 9; 29, tarsus of leg 9; 30, pygidium, posterior part, sternal view; 31, anal plate, tergal view. Scale a: Figs 22, 24-26; b: Figs 27-31; c: Fig. 23.

Antennae. Segment 4 with 4 setae, p' not studied, p subcylindrical, tapering distally, annulate, p'' cylindrical, striate, p''' a rudimentary knob, relative lengths of setae: $p = 100$, $p' = ?$, $p'' = 33$. Tergal branch t somewhat fusiform, 2.2 times as long as greatest diameter and 1.2 times as long as sternal branch s . The latter 1.4 times as

long as greatest diameter, anterodistal corner truncated. Seta q as seta p of 4th segment but much thinner, 1.6 times as long as s . Relative lengths of flagella (base segments included) and base segments alone: $F_1 = 100$, $bs_1 = 8$; $F_2 = 27$, $bs_2 = 4$; $F_3 = 77$, $bs_3 = 6$. F_1 5.1 times as long as t , F_2 and F_3 1.7 and 4.8 times as long as s respectively. Distal calyces low, distal part of flagella axes widened, fusiform. Globulus g 1.2 times as long as greatest diameter, ≈ 9 bracts, capsule somewhat longer than wide; width of g 0.9 of greatest diameter of t . Antennae glabrous.

Trunk. Setae of collum segment simple, cylindrical, blunt, densely annulate. Sublateral seta twice longer than submedian seta; sternite process narrow anteriorly and with small V-shaped anterior incision. Appendages wide, obliquely subcylindrical, caps flat. Process and appendages glabrous.

Setae on tergites thin, short, similar to those on tergal side of head, 4+4 setae on tergite I, probably 6+6 on II-IV, 4+2 on VI. Posteromedian setae on tergite VI pointed, annulate, 0.2 of their interdistance.

Bothriotricha. All bothriotricha except T_4 lost or broken. $T_4 = 55 \mu\text{m}$, with thin, simple, straight axes, pubescence of straight, simple, almost erect hairs, which are longest just outside the middle.

Legs. Seta on coxa of leg 9 very thin, simple, cylindrical, striate; seta on trochanter furcate, main branch as on coxal seta, secondary branch very short and thin, striate. These setae simple on legs 1-8. Tarsus of leg 9 tapering, 2.5 times as long as greatest diameter. Proximal seta very thin, cylindrical, blunt, striate, curved inwards. Distal seta somewhat clavate, striate, its length 0.3 of length of tarsus and 1.9 times as long as proximal seta. Cuticle of tarsus glabrous.

Pygidium. Tergum. Posterior margin rounded, but with slight indentation below setae a_1 . Relative lengths of setae: $a_1 = 10$, $a_2 = 7$, $a_3 = 15$, $st = 2$. a_1 , a_2 and a_3 very thin, tapering, striate distally, diverging; st short, somewhat clavate, curved inwards and converging. Distance $a_1 - a_1$ almost as long as a_1 and somewhat longer than distance $a_1 - a_2$, which is twice longer than distance $a_2 - a_3$; distance $st - st$ 3 times longer than st and 0.6 of distance $a_1 - a_1$. Cuticle glabrous.

Sternum. Posterior margin between b_1 almost straight. Relative lengths of setae ($a_1 = 10$): $b_1 = 23$, $b_2 = 13$. These setae thin, tapering, striate distally. b_1 0.9 of their interdistance, b_2 as long as distance $b_1 - b_2$.

Anal plate narrow at base, broadly spatulate with rounded posterolateral corners. Posteromedian margin almost straight but with small indentation on tergal side, somewhat cordate in dorsal view. Plate 1.1 times as long as wide, posterolateral corners each with a short-stalked subspherical appendage. Appendages diverging, 1/3 of length of plate. Plate with short pubescence, indistinct and irregular on sternal side, arranged in 6 distinct longitudinal rows on tergal side; pubescence longest and erect on appendages.

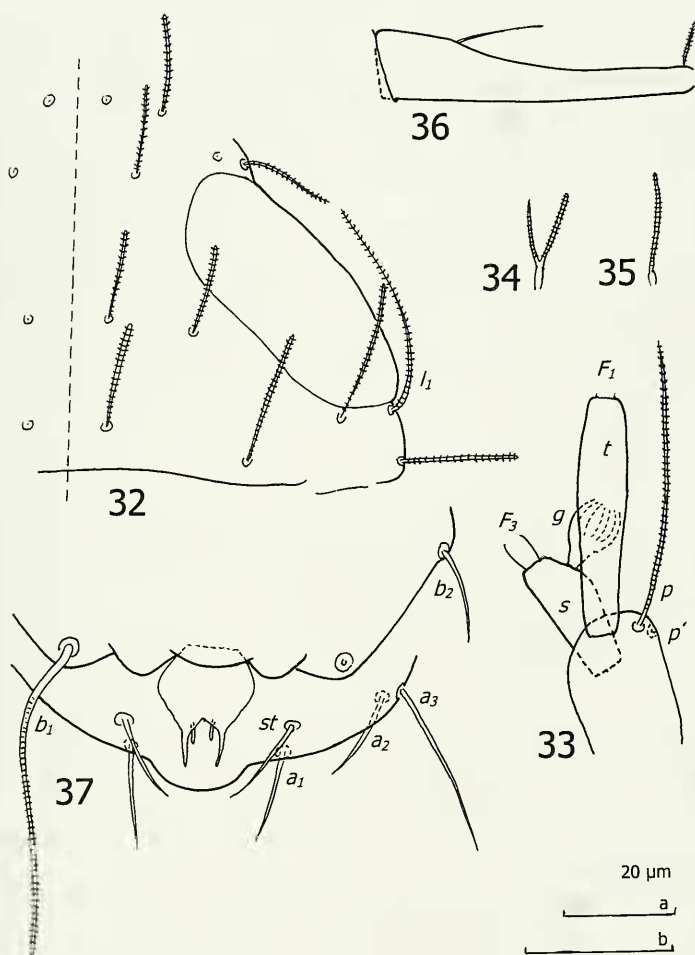
4. *Allopauropus (D.) absimilis* sp. n.

Figs 32-37

Type material: **Holotype:** ad. 9(♀), VIETNAM, Kien Giang Province, Kien Luong, Hon Chong, Nui Hang Tien, under bush on limestone, soil sample, Berlese extraction, 19.I.2000 (Loc. VIET-868).

Other material. Same data as holotype, 1 juv. 3.

Total number. 2 specimens.



FIGS 32-37

Allopaupopus (D.) *absimilis* sp. n., holotype, ad. 9(♀). 32, head, median and right part, tergal view; 33, left antenna, tergal view; 34, seta on coxa of leg 9; 35, seta on trochanter of leg 9; 36, tarsus of leg 9; 37, pygidium, posteromedian and left part, sternal view. Scale a: Figs 34-36; b: Figs 32, 33, 37.

Diagnosis. *A. absimilis* sp. n. may be a close relative to Remy's *A. consociatus* from Madagascar (Remy, 1956a). The anal plates have the same groundplan and the antennal globuli are similar in both species. They can be distinguished by the shape of the posterior processes of the anal plate (0.5 of the length of plate in *A. absimilis* sp. n., as long as plate in *A. consociatus* Remy), by the shape of the seta on trochanter of leg 9 (simple, not furcate) and by some setae on the pygidial tergum ($a_1 > a_1 - a_1$, not $a_1 < a_1 - a_1$; *st* pointed, not blunt).

Etymology. From Latin *absimilis* = unlike (referring to the processes and appendages of the anal plate).

DESCRIPTION

Length. 0.81 mm.

Head. Most setae cylindrical, striate; all of those studied blunt, except a_3 in 2nd tergal row and l_1 which are tapering. Relative lengths of setae (a_2 in 1st row = 10, a_1 lacking.); 2nd row: $a_1 = 9$, $a_3 = 10$; 3rd row: $a_1 = a_2 = 9$; 4th row: $a_1 = a_4 = 11$, $a_2 = a_3 = 14$; lateral group of setae: $l_1 = 21$. Temporal organs 1.4 times as long as their shortest interdistance. Head cuticle glabrous.

Antennae. Antennae in bad condition. Seta p cylindrical, tapering distally, striate, $l = 40$, $p'' = 10 \mu\text{m}$. Tergal branch t thin, slender, 5.3 times as long as greatest diameter and 1.8 times as long as sternal branch s which is about 2.4 times as long as its greatest diameter; anterior corner distinctly truncate. Flagellum F_3 , $l = 83$ (base segment included), base segment alone $l = 4 \mu\text{m}$. F_3 4.6 times as long as s . Globulus g 1.5 times as long as greatest diameter; width of g 1.6 times as long as greatest diameter of t . Antennae glabrous.

Trunk and bothriotricha not available for study.

Legs. Seta on coxa of leg 9 furcate, branches similar to each other, cylindrical, blunt, striate; seta on trochanter simple, similar to main branch of coxal seta. These setae on legs 1-8 simple, seta on coxa thickest, seta on trochanter longest. Tarsus of leg 9 4.5 times as long as greatest diameter, very slender in distal 2/3. Proximal seta thin, tapering, pointed, with minute pubescence in distal half; proximal seta 0.3 of length of tarsus and twice longer than distal seta; the latter subcylindrical, tapering, pointed, striate. Cuticle of tarsus faintly granular.

Pygidium. Tergum. Posterior margin evenly rounded, but with distinct semicircular lobe between st above anal plate. Relative lengths of setae: $a_1 = 10$, $a_2 = 11$, $a_3 = 17$, $st = 9$. These setae tapering, pointed, almost glabrous; a_1 , a_2 and st converging, a_3 diverging. Distance $a_1 - a_1$ 1.4 times as long as a_1 ; distance $a_1 - a_2$ 3.8 times as long as distance $a_2 - a_3$; distance $st - st$ 1.8 times as long as st and 1.1 times as long as distance $a_1 - a_1$. Cuticle glabrous.

Sternum. Posterior margin between b_1 with 3 inner lobes, median one lowest and situated below anal plate. Relative lengths of setae ($a_1 = 10$): $b_1 = 30$, $b_2 = 8$ and 9. These setae thin, tapering, striate distally. b_1 1.2 times as long as their interdistance, b_2 0.7 of distance $b_1 - b_2$. Cuticle glabrous.

Anal plate 1.1 times as wide as long, narrowest anteriorly, with convex lateral margins and two posterior triangular lobes separated by a broadly V-shaped incision. Each lobe with a subcylindrical and tapering process protruding backwards, processes almost 0.5 of length of plate. Besides, two short subparallel appendages protruding backwards-downwards from inner sternal side of posterior lobes; length of appendage 0.5 of length of posterior processes. Plate and appendages glabrous.

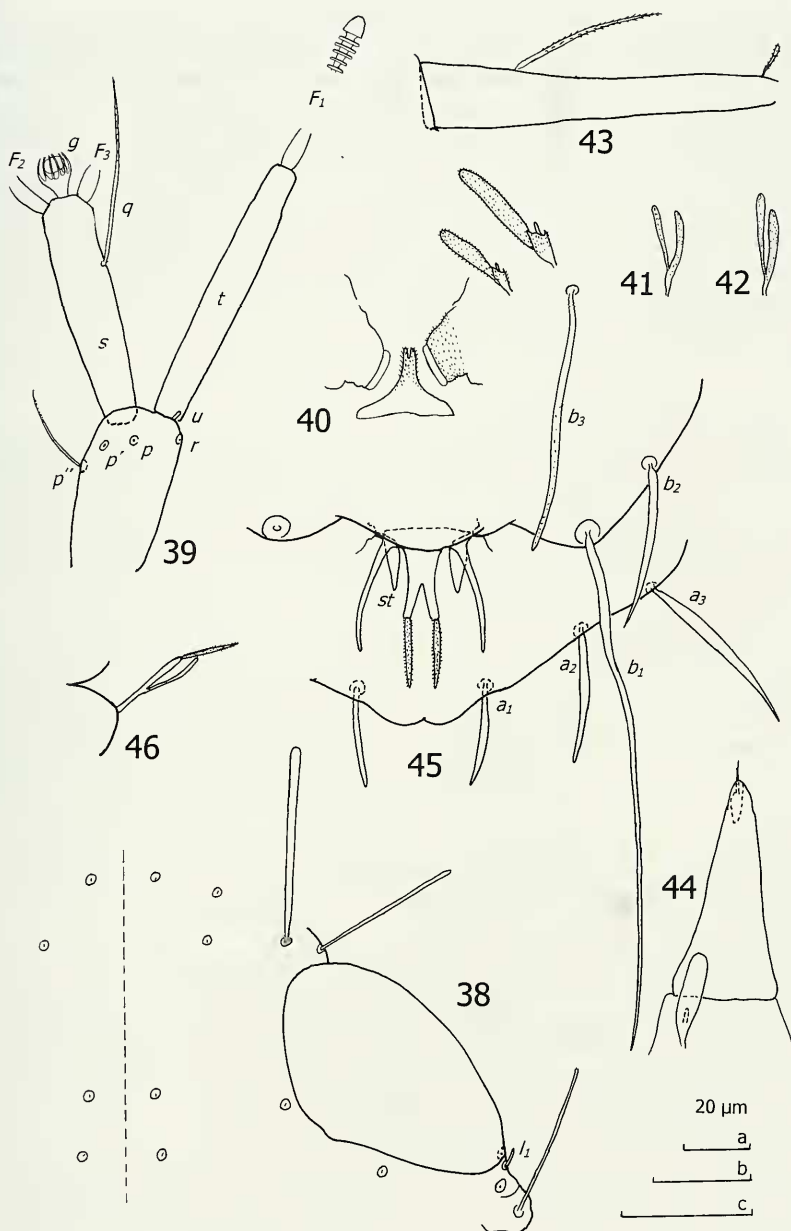
Genus *Pauropus* Lubbock, 1867

5. *Pauropus asiaticus* sp. n.

Figs 38-46

Type material. Holotype: ad. 9(♀), VIETNAM, Kien Giang Province, Kien Luong, Hon Chong, Nui Hang Tien, under bush on limestone, litter, Berlese extraction, 19.I.2000 (Loc. VIET-865). *Paratypes:* Same data as holotype, 1 ad. 9(♀) (Loc. VIET-863). Ibidem, soil sample, Berlese extraction, 3 ad. 9(♂), 1 subad. 8(♀), 19.I.2000 (Loc. VIET-864).

Total number. 6 specimens.



FIGS 38-46

Pauropus asiaticus sp. n., holotype, ad. 9 (♀). 38, head, median and right part, tergal view; 39, right antenna, tergal view; 40, collum segment, median and left part, sternal view; 41, seta on coxa of leg 9; 42, seta on trochanter of leg 9; 43, tarsus of leg 9; 44, right genital papilla, outer lateral view; 45, pygidium, median and left side, sternal view; 46, anal plate, lateral view. Pubescence only partly drawn in Fig. 40. Scale a: Figs 41-43; b: Figs 39, 40, 44; c: Figs 38, 45, 46.

Diagnosis. *P. asiaticus* sp. n. closely resembles *P. forficularis* Scheller from Sri Lanka (Scheller, 1970). Distinctive characters are e.g. the shape of both the lateral branches and the posteromedian appendages of the anal plate (the former subcylindrical and long in *P. asiaticus* sp. n., tapering and short in *P. forficularis* Scheller; the latter lanceolate in *P. asiaticus* sp. n., claw-like in *P. forficularis*). The setae of the pygidial tergum are glabrous in *P. asiaticus* sp. n., but with a distinct pubescence in *P. forficularis*, and the pygidial setae a_3 are 1.5 times as long as the a_2 in *P. asiaticus* sp. n., almost of the same length in *P. forficularis*. The new species may also be close (but to a less degree) to *P. wieheorum* Remy from Mauritius (Remy, 1959) and to *P. difficilis* Remy from Pondichéry (Remy, 1961).

Etymology. Latinized adjective of Asia.

DESCRIPTION

Length. (0.98-)1.02(-1.42) mm.

Head. Most tergal setae lacking, those studied indicating long blunt glabrous setae. a_2 in 1st and 2nd rows and a_1 in 3rd row somewhat clavate; a_3 in 2nd row and a_4 in 4th row cylindrical. Temporal organs covering almost whole the posterior half of lateral side of head, their length 0.8 of their shortest interdistance. A very small pore in posterior part of temporal organ close to insertion point of l_1 . Head cuticle and temporal organs glabrous.

Antennae. Segment 4 with 6 cylindrical setae, most of them lacking. In a paratype specimen $p'' = 13 \mu\text{m}$, $p''' = 2$ and $u = 1 \mu\text{m}$. Tergal branch t very slender, subcylindrical, 7.0(-7.1) times as long as its greatest diameter and (1.2-)1.3 times as long as sternal branch s which is very little clavate, (3.9-)4.3 times as long as its greatest diameter. Seta q cylindrical, tapering distally, indistinctly striate, 0.9 of length of s . Relative lengths of flagella (base segments included) and base segments alone: $F_1 = 100$, $bs_1 = 6(-7)$; $F_2 = (63-79)(-82)$, $bs_2 = 6$; $F_3 = (78-86)$, $bs_3 = 6(-7)$; F_1 2.3(-2.5) times as long as t , F_2 and F_3 (2.2-)2.4 and (2.6-)2.7 times as long as s respectively. Globulus g 1.5 times as long as wide, with 9(-11) bracts, capsule with flattened bottom, width of g 0.9 of greatest diameter of t . Antennae glabrous.

Trunk. Setae of collum segment furcate, both branches with minute pubescence; primary branch foliiform, (6.5-)6.6 times as long as broad, secondary branch rudimentary, subcylindrical. Sublateral setae 1.4(-1.5) times as long as submedian ones. Sternite process with narrow anterior part with distal incision; appendages low with flat caps; process and appendages with distinct pubescence.

Setae on tergite I lanceolate, glabrous; 4+4 setae on I, 6+6 on II-IV, ? on V and VI.

Bothriotricha. Most bothriotricha lost or broken. Relative lengths of them: $T_1 = 100$, $T_2 = 101$, $T_3 = (107-108)$, $T_4 = (156)$, $T_5 = ?$. Bothriotricha with thin straight axes with short pubescence, for the greatest part oblique but distally erect.

Genital papillae (paratypes). Genital papillae with almost straight sides, narrowly conical, 2.1-2.2 times as long as greatest diameter, glabrous. Apical seta short, 0.1-0.2 of length of papilla. Seta on coxa of leg 2 as coxal setae on other anterior legs.

Legs. Posterior legs long. Setae on coxa and trochanter of leg 9 furcate, with minute pubescence, main branch thickest, fusiform; secondary branch somewhat

clavate (or cylindrical), blunt, protruding from a point 1/4 above the base of seta; secondary branch 0.8 of length of primary branch. More anteriorly these setae with a rudimentary cylindrical glabrous secondary branch. Tarsus of leg 9 strongly tapering, slender, 5.5(-6.0) times as long as greatest diameter. Setae with short oblique pubescence, proximal seta tapering, pointed; distal seta somewhat clavate, blunt. Proximal seta 0.4 of length of tarsus and 4.4 times as long as distal seta. Cuticle of tarsus with minute pubescence.

Pygidium. Tergum. Posterior part broadly triangular, between a_1 a small lobe with median incision. Relative lengths of setae: $a_1 = 10$, $a_2 = 12(-13)$, $a_3 = 17(-18)$, $st = 6$. All setae glabrous, all but st lanceolate, somewhat curved inwards, st broadly lanceolate, bent outwards and converging; a_1 and a_2 directed posteriorly, a_3 diverging. Distance $a_1 - a_1$ 1.2 times as long as a_1 ; distance $a_1 - a_2$ 1.3 times as long as distance $a_2 - a_3$; distance $st - st$ (1.4-)1.5 times as long as st and 0.8 of distance $a_1 - a_1$.

Sternum. Posterior margin between b_1 broadly indented and with low rounded median bulge below anal plate. Relative lengths of setae ($a_1 = 10$): $b_1 = 47$, $b_2 = 15$, $b_3 = 24$. b_1 tapering, pointed, glabrous; b_2 lanceolate, somewhat curved inwards, glabrous; b_3 subcylindrical and with minute pubescence most distally. b_1 1.7 times as long as their interdistance, b_2 2.0(-2.1) times as long as distance $b_1 - b_2$; b_3 0.9 of distance $b_3 - b_3$.

Anal plate broadest anteriorly, this part with two posterolateral branches directed backwards-outwards and somewhat curved inwards, their length 0.7 of total length of plate with appendages. Posteromedian part of plate subrectangular, with posterior V-shaped cleft separating two branches, each with a distal, posteriorly directed, somewhat lanceolate appendage with short erect pubescence. Length of appendages almost 0.5 of length of lateral branches.

EURYPAUROPODIDAE

In most collections of Pauropoda Eurypauropodidae are poorly represented. The occurrence of 3 species, 2 of them new to science, in this material from Vietnam, indicates a proportionally high species diversity. This is in accordance with previous reports from south Asia, from Thailand (Scheller, 1995) and from Nepal (Scheller, 2000), which show that Eurypauropodidae, at least locally, may be almost as diverse as Pauropodidae. A further indication in this direction are two other *Samarangopus* species occurring in this collection which are unfortunately not in the best condition and therefore not described. One, 1 ad. 9(♂) and 1 juv. 5, from a limestone hill at Hon Chong, Nui Hang Tien, (Loc.VIET-866), is close to *S. longipenes* Scheller from Borneo (Scheller, 2001). The other, a juv. 6 specimen, from Hon Chong, Mo So, (Loc. VIET-014), is close to *S. segniter* Scheller (Scheller *et al.*, 1994) from Borneo.

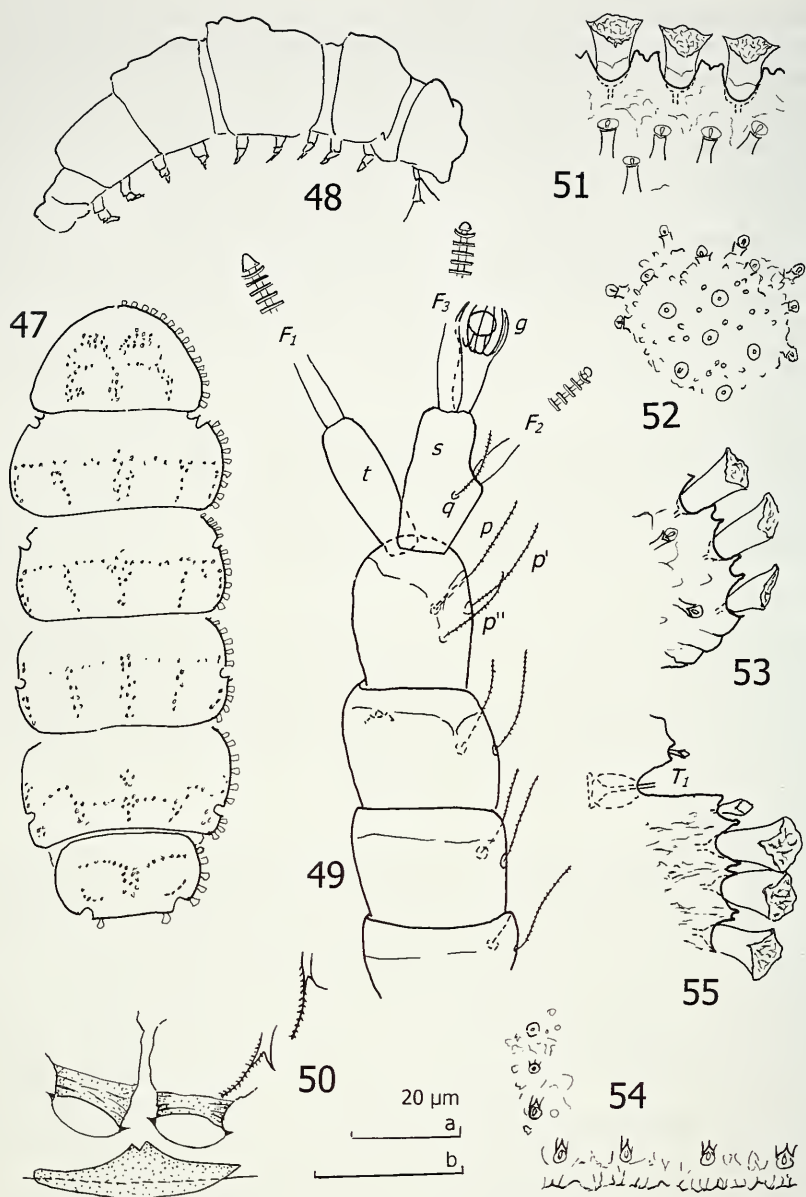
Eurypauropodinae

Genus *Samarangopus* Verhoeff, 1934

6. *Samarangopus campanulatus* sp. n.

Figs 47-64

Type material. **Holotype:** ad. 9(♀) VIETNAM, Kien Giang Province, Kien Luong, Hon Chong, Mo So, under bush on limestone, humus on rock, Berlese extraction, 18.XII.1994 (Loc. VIET-018, leg. Deharveng & Le Cong Kiet). **Paratypes:** Same data as holotype, 6 ad. 9(2♂, 4♀), 1 subad. 8(♀).



Figs 47-55

Samarangopus campanulatus sp. n., holotype, ad. 9(♀). 47, body, tergal view, tergites I-VI showing the symmetric pattern of depressions surrounded by raised cuticle; 48, body, lateral view; 49, right antenna, sternal view; 50, collum segment, median and left part, sternal view; 51, tergite I, part of anterior margin, tergal view; 52, tergite I, central part; 53, tergite I, right posterolateral corner; 54, tergite I, median part of posterior margin; 55, tergite II, right anterolateral corner, tergal view. Scale a: Figs 51-55; b: Figs 49-50.

Other material. VIETNAM, Kien Giang Province, Kien Luong, Hon Chong, Mo So, under bush on limestone, soil sample, Berlese extraction, 1 ad. 9(♂), 18.XII.1994 (Loc. VIET-013, leg. Deharveng & Le Cong Kiet). Ibidem, Hon Chong, Batai hill, under bushes, soil sample, Berlese extraction, 1 ad. 9(♀), 1 juv. 3, 21.XII.1994 (Loc. VIET-028, leg. Deharveng & Le Cong Kiet). Ibidem, Hon Chong, Nui Son Cha, under bush on limestone, litter, Berlese extraction, 1 ad. 9(♂), 1 juv. 5, 18.I.2000 (Loc. VIET-836). Ibidem, Hon Chong, Nui Hang Tien, under bush on limestone, soil sample, Berlese extraction, 1 ad. 9(♂), 1 juv. 5, 19.I.2000 (Loc. VIET-866).

Total number. 15 specimens.

Diagnosis. *S. campanulatus* sp. n. is most similar to the Bornean *S. segniter* Scheller (Scheller *et al.*, 1994) and to *S. doiinthanoneus* Scheller from north-western Thailand (Scheller, 1995). Distinctive characters in relation to *S. segniter* Scheller are: the shape of the pygidial setae *st* (straight and longer than a_1 in *S. campanulatus* sp. n., curved outwards and very short in *S. segniter* Scheller), the shape of the posterior margin of the pygidial sternum (straight in *S. campanulatus* sp. n., with posteromedian lobe with median incision in *S. segniter*) and the shape of the pygidial setae b_2 (thin tapering in *S. campanulatus* sp. n., broad lanceolate in *S. segniter*). Distinctive characters in relation to *S. doiinthanoneus* are: the number of large protuberances on the posterior margin of tergite VI (one protuberance behind the pit of bothriotrix T_5 in *S. campanulatus* sp. n., two in *S. doiinthanoneus* Scheller), the shape and pubescence of the bothriotrix T_3 (proportionally large distal swelling with minute pubescence in *S. campanulatus* sp. n., indistinct swelling and distinct pubescence in *S. doiinthanoneus*) and the length of the pygidial setae *st* (about half of the length of the anal plate in *S. campanulatus* sp. n., as long as the anal plate in *S. doiinthanoneus*).

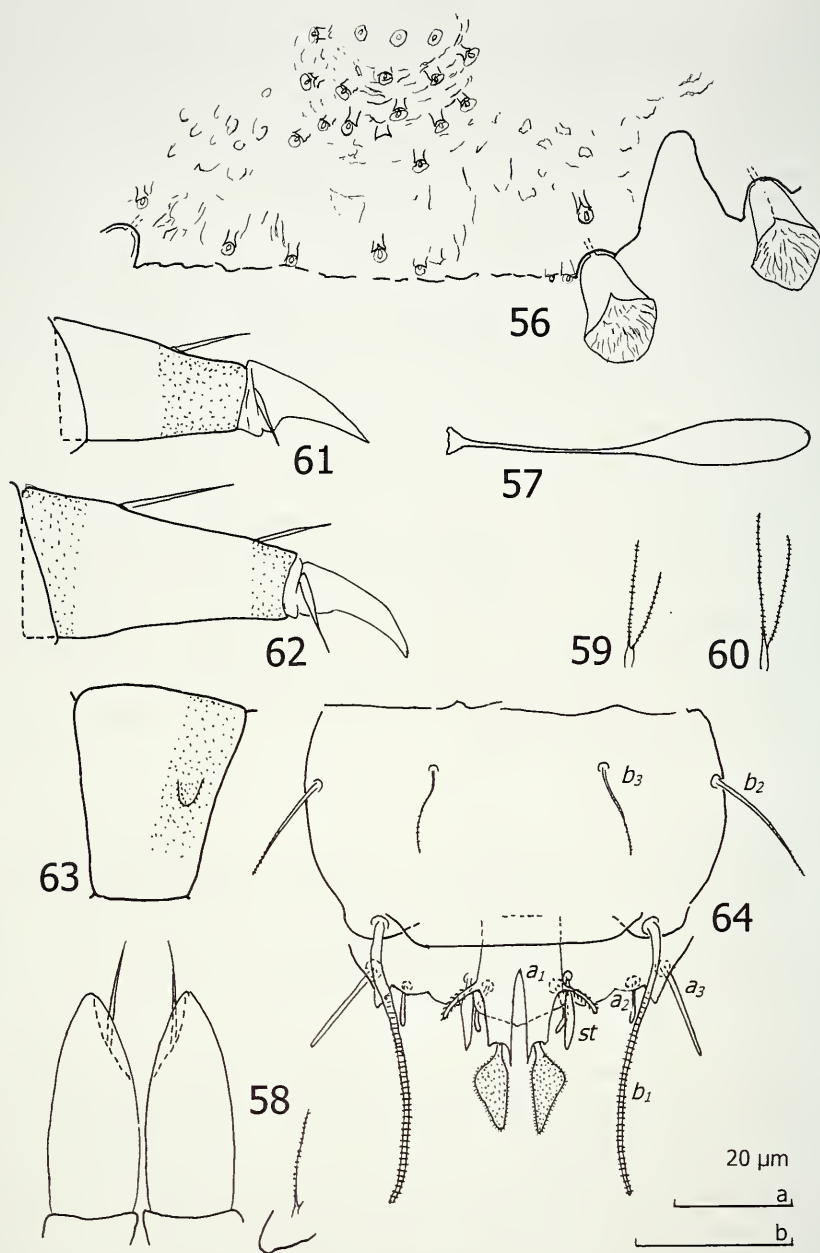
Etymology. From Latin campana = bell (referring to the shape of the large marginal setae on the anterior tergites).

DESCRIPTION

Length. (0.74-)0.84(-0.90) mm.

Head (holotype only). *Vertex*: no setae. *Tempus*: not studied. Index of setae, lateral row, 3 setae, $lp_1 = ?$, $lp_2 = 20$, $lp_3 = 14$, $lp_1 - lp_2 = ?$, $lp_2 - lp_3 = ?$, $lp_1 - lp_1 = 16$; anterior row, 3 setae, $la_1 = 8$, $la_2 = 17$, $la_3 = 21$, $la_1 - la_2 = 7$, $la_2 - la_3 = la_1 - la_1 = 13$ μ m. Distance $la_1 - la_1/la_1 - la_2 = 1.9$. Peristomal setae: *ipe* not ascertained, $pe_1 = 9$, $pe_2 = 14$, $pe_3 = 13$, $pe_4 = 14$, $pe_5 = 20$, $pe_1 - pe_2 = 3$, $pe_2 - pe_3 = 2$, $pe_3 - pe_4 = 5$, $pe_4 - pe_5 = 11$, $pe_1 - pe_1 = 16$ μ m.

Antennae. Antennae almost glabrous; chaetotaxy of segments 1-4: 2/2/2+g'/3; setae thin, cylindrical, striate, their lengths on segment 4: $p = 18(-20)$, $p' = (15-16)$, $p'' = 13(-16)$ μ m; no p''' , u and r . Sternal branch s with distinct anterior indentation at level of F_2 , anterior margin = (11-)13, posterior margin = (19-)20(-21), \emptyset of base = 6(-7), maximum $\emptyset = 11(-12)$, q thin, cylindrical, annulate-striate, $l = 10(-16)$ μ m. Posterior margin/length of g 1.3(-1.7), posterior margin/maximum $\emptyset = 1.8(-1.9)$, maximum \emptyset/\emptyset of base = (1.7-)1.8. Tergal branch fusiform, widest in distal half, $l = 20$ (-24), \emptyset of base = 5, maximum $\emptyset = 7(-8)$ μ m; pore not ascertained; length of t /maximum $\emptyset = (2.5-)2.7$. Globulus g , $l = (12-)14(-15)$, maximum $\emptyset = 7(-8)$ μ m; length l /maximum $\emptyset = (1.8-)2.0$; number of bracts (10-)13, their length = 7, capsule spherical, $\emptyset = 3$ μ m. Relative lengths of flagella (base segments included): $F_1 = 100$, $F_2 = 42(-49)$, $F_3 = (79)82(-85)$. Lengths of base segments: $bs_1 = 10(-13)$, $bs_2 = 7(-8)$, $bs_3 =$



FIGS 56-64

Samarangopus campanulatus sp. n.: 56-57, 59-64, holotype, ad. 9(♀), 58, paratype ad. 9(♂). 56, tergite VI, median and right posterolateral part; 57, T_3 ; 58, genital papillae, anterior view; 59, seta on coxa of leg 9; 60, seta on trochanter of leg 9; 61, tarsus of leg 1; 62, tarsus of leg 9; 63, femur of leg 1 with appendage; 64, pygidium, sternal view. Pubescence only partly drawn in Figs 61-63. Scale a: Figs 56-58; b: Figs 59-64.

11(-12) μm . F_1 (3.6-)4.1 times as long as t , F_2 and F_3 (1.8-)2.1 and (3.3-)3.4 times as long as s , respectively. F_2 thinner than F_1 and F_3 . Calyces of F_1 largest, conical, those of F_2 and F_3 smaller, subhemispherical.

Trunk. Setae of collum segment similar to each other, furcate. Branches tapering, pointed; main branch, striate; secondary branch rudimentary, glabrous; both setae $l = 13(-14)$ μm . Sternite process broad and low, with anterior V-shaped incision. Appendages directed posteriorly, barrel-shaped, caps flat and with collar. Process and appendages with minute pubescence, caps glabrous.

Tergites. A single row of campanulate protuberances on anterior and lateral margins of tergite I, on lateral margins of II-V and on posterior margin of VI. Central part of all tergites with small cylindrical cuticular structures with distal candleflame-like vesicle surrounded by circular, funnel-shaped, transparent collar. Surface between these organs coarse.

Tergites I-VI with a symmetric pattern of depressions surrounded by raised cuticle with the above mentioned subcylindrical structures (Figs 47, 52, 54, 56). Number of campanulate marginal protuberances: I (27-)31; II, 1 small - T_1 - 1 small + (8-) 9; III, 5(6) - T_2 - 1 small + (6-)7; IV, 5(-6) - T_3 - (4-)5; V, 7 - T_4 - 4; VI, (5-)6 - T_5 - 1. Length/width ratio of tergites: I = (0.5-)0.6, II and V = 0.4(-0.5), III and VI = 0.5, IV = 0.5(-0.6).

Bothriotricha. All bothriotricha but T_3 curled distally and with very thin axes; these glabrous except for a minute pubescence on their distal third. T_3 with thicker axes and distal 2/5 increasing in width, forming a clavate distal end-swelling with minute pubescence. Relative lengths of bothriotricha: $T_1 = 100$, $T_2 = 62(-105)$, $T_3 = 28(-53)$, $T_4 = ?(72-82)$, $T_5 = (72-)81(-100)$.

Genital papillae. Base segments cylindrical. Length of papillae = 39(-48) μm , greatest $\varnothing = 16(-20)$ μm , length of seta = 20 μm . Proximal part of genital papillae subcylindrical, distal part conical, seta (0.4-)0.5 of length of papilla, which is 2.4 times as long as greatest diameter. Cuticle glabrous. Coxal seta of leg 2 as on leg 1, length = 17(-20) μm .

Legs. All legs 5-segmented. Seta on coxa and trochanter of leg 9 subsimilar to each other, very thin, furcate, striate, with glabrous base; length of secondary branch 0.7-0.8 of primary one. More anteriorly these setae with rudimentary pointed glabrous secondary branches. Tarsi short, tapering, those of leg 9 1.8(-1.9) times as long as greatest diameter, with two tergal setae, both pointed and glabrous. Proximal seta (13-)15, distal one 9(-10) μm . Proximal setae 0.4(-0.5) of length of tarsus and (1.3-)1.7 times as long as distal seta. Cuticle of tarsus with minute pubescence. No proximal seta on tarsus of leg 1. All legs with large main claw and small setose anterior secondary claw; on leg 9 the former reaching 0.5 of the length of tarsus. On anterior side of femur of leg 1 a blunt appendage with short pubescence, length = 4(-5) μm .

Pygidium. Tergum. Posterior margin between the lateral digitiform appendages with 5 lobes, a triangular median one and two rounded ones on each side of it. Setae glabrous, a_1 and a_2 somewhat clavate, the former curved inwards and the latter almost straight; a_3 straight, cylindrical, somewhat tapering, diverging; st straight, lanceolate. Lengths of setae: $a_1 = a_2 = (5-)6$, $a_3 = (10-)12(-14)$, $st = 9(-12)$ μm . Distance $a_1 - a_1 = 9(-11)$, $a_2 - a_2 = (28-)29(-30)$, $a_3 - a_3 = (34-)37(-39)$, $a_1 - a_2 = 9(-10)$, $a_2 - a_3 = 5$, $st - st$

= 9(-12) μm . Distance $a_1 - a_1$ 1.5(-2.0) times as long as a_1 , distance $a_1 - a_2$ (1.8-)2.0 times as long as distance $a_2 - a_3$; distance $st - st$ (1.1-)1.3 times as long as st and (1.1-)1.3 times as long as distance $a_1 - a_1$. Cuticle glabrous.

Sternum. Posterior margin with shallow indentations just inside b_1 and in between a broad low lobe with straight posterior margin. Setae thin, tapering, distally striate, b_2 and b_3 pointed. Lengths of setae: $b_1 = (32\text{-})37$, $b_2 = 15$ and $17(-19)$, $b_3 = (11\text{-})12$ μm . Distance $b_1 - b_1 = (34\text{-})36$, $b_2 - b_2 = (47\text{-})50$, $b_3 - b_3 = (21\text{-})22(-23)$, $b_1 - b_2 = (18\text{-})20$, $b_2 - b_3 = (13\text{-})14$ μm . Distance $b_1 - b_1$ (0.9-)1.0 of the length of b_1 , b_2 0.7-0.8 of distance $b_1 - b_2$, b_3 0.5 of distance $b_3 - b_3$.

Anal plate twice as wider than long, widest in the middle, widest part about 1.5 times as wide as distal part; broadest part forming indistinct posterolateral corners, from there two short, thin, cylindrical, blunt, pubescent appendages protruding obliquely backwards; appendages 0.3 of length of plate; posterior 3/5 of plate divided into two tapering branches by a narrow V-shaped incision, each branch provided with two appendages: a submedian short straight tapering glabrous one and a stalked bladder of triangular shape in sternal view. Bladder-shaped appendages 0.6 of length of plate. Plate glabrous, bladder-shaped appendages with short erect pubescence.

Sphaeropauropodinae

Genus *Sphaeropauropus* Silvestri, 1930

7. *Sphaeropauropus malayus* Silvestri, 1930

Sphaeropauropus malayus Silvestri, 1930: 229-231, figs 3-4.

Material. VIETNAM, Kien Giang Province, Kien Luong, Hon Chong, Mo So, under bush on limestone, soil sample, Berlese extraction, 1 ad. 9(♀). 18.XII.1994 (Loc. VIET-014, leg. Deharveng & Le Cong Kiet).

Total number. 1 specimen.

General distribution. *S. malayus* has been reported from Java (Silvestri, 1930; Scheller, 1998), Réunion (Remy, 1956b) and the Philippines (Remy, 1957b). However, only on the base of the descriptions, none of the specimens reported by Remy seems to be completely identical with the type specimens from Java (Scheller, 1998) and only an examination of Remy's specimens can decide about their conspecificity with *S. malayus*.

8. *Sphaeropauropus lecongkietii* sp. n.

Figs 65-84

Type material. **Holotype:** ad. 9(♂), VIETNAM, Kien Giang Province, Kien Luong, Hon Chong, Mo So, under bush on limestone, soil sample, Berlese extraction, 18.XII.1994 (Loc. VIET-020, leg. Deharveng & Le Cong Kiet). **Paratypes:** VIETNAM, Kien Giang Province, Kien Luong, Hon Chong, Batai, under bush on limestone, soil sample, Berlese extraction, 1 ad. 9(♀), 1 subad. 8(♀), 18.I.2000 (Loc. VIET-844).

Other material. VIETNAM, Kien Giang Province, Kien Luong, Hon Chong, Batai, under bushes, 1 subad. 8(♀), 1 juv. 5, 21.XII.1994 (Loc. VIET-028, leg. Deharveng & Le Cong Kiet). Ibidem, same date, 1 subad. 8(♀) (Loc. VIET-029, leg. Deharveng & Le Cong Kiet). Ibidem, Hon Chong, near pagoda, under bushes, litter, Berlese extraction, 1 ad. 9(♀), 1 subad. 8(♂), 19.I.2000 (Loc. VIET-846).

Total number. 8 specimens.

Diagnosis. *S. lecongkietii* sp. n. is close to *S. breviglobulatus* Scheller from Nepal (Scheller, 2000) by similarities in the shape of the tuft-like setae and the

pubescence on the tergites and in the general shape of the anal plate. Good distinctive characters are: the shape of the setae ipe_2 (simple and clavate in *S. lecongi* sp. n., thin and furcate distally in *S. breviglobulatus*), the proportion between the length of the base segment of the F_3 and the length of the sternal branch s (0.5, not 0.8), and the shape of the antennal globulus g (2.3 times as long as greatest width, not 1.2; 8-9 bracts, not 10-13; capsule spherical, not flattened). The two species may also be distinguished by the peculiar structure in the anterior part of the tergites V and VI (Figs 73-75), occurring in *S. lecongi* sp. n., but not in *S. breviglobulatus*.

Etymology. Dedicated to one of the collectors, Professor Le Cong Kiet (Ho Chi Minh City).

DESCRIPTION (holotype only)

Length. 0.85 mm.

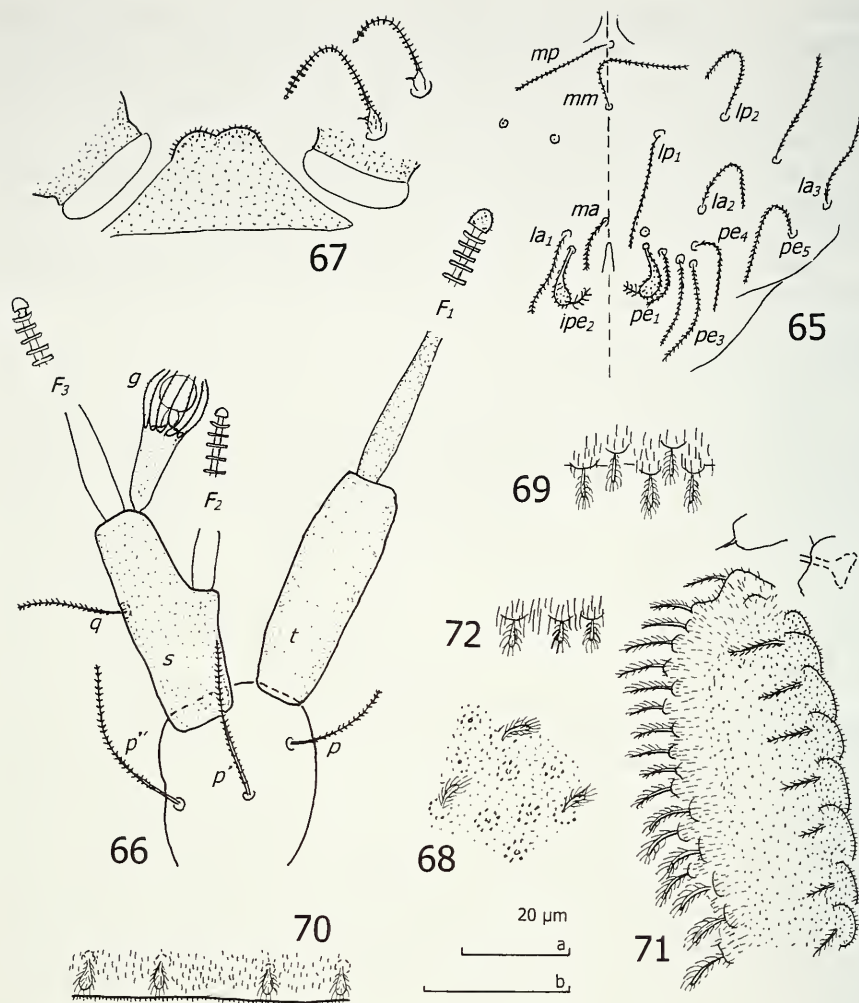
Head. All setae but ipe_2 cylindrical, thin, pointed, striate; ipe_2 clavate, bent inwards, with short pubescence. Vertex: no setae. Tempus: *te* not identified, no fungiform organ. Frons: frontal pore not identified. Index of frontal setae: median row, 3 setae, $mp = 20$, $mm = 25$, $ma = 10$, $mp - mm = 10$, $mm - ma = 21$ μ m; lateral row, 3 setae, $lp_1 = 22$, $lp_2 = 20$, $lp_3 = 24$, $lp_1 - lp_2 = 12$, $lp_2 - lp_3 = 13$, $lp_1 - lp_3 = 19$ μ m; anterior row, 3 setae, $la_1 = 16$, $la_2 = 19$, $la_3 = 17$, $la_1 - la_2 = 10$, $la_2 - la_3 = 22$, $la_1 - la_3 = 15$ μ m. Distance $la_1 - la_3 / la_1 - la_2 = 1.4$. Peristomal setae, ? in number, ipe_1 and lb not ascertained, $ipe_2 = 9$, $pe_1 = 13$, $pe_2 = 17$, $pe_3 = 20$, $pe_4 = 16$, $pe_5 = 25$, $pe_1 - pe_2 = 4$, $pe_2 - pe_3 = 2$, $pe_3 - pe_4 = ?$, $pe_4 - pe_5 = 18$, $pe_1 - pe_5 = 20$, $pe_5 - pe_3 = 68$ μ m.

Antennae. Cuticle of segments 1-4 and branches t and s sparsely granular, g and flagella glabrous. Chaetotaxy of segments 1-4: 2/2/2/3. Setae subcylindrical, tapering, annulate; g' not ascertained, setae on segment 4, $p = 24$, $p' = 22$, $p'' = 16$ μ m. Sternal branch with distinct anterodistal truncation at the level of F_2 , anterior margin = 17, posterior margin = 26, \emptyset of base = 8, maximum $\emptyset = 14$, $q = 16$ μ m. Anterior margin/length of $g = 0.9$; anterior margin/length of $q = 1.1$; anterior margin/posterior margin = 0.7; anterior margin/maximum $\emptyset = 1.2$; maximum \emptyset / \emptyset of base = 1.7. Tergal branch t fusiform, length = 33, \emptyset of base = 5, maximum $\emptyset = 11$ μ m, length of t /maximum $\emptyset = 3.0$. Globulus g straight, $l = 20$, maximum $\emptyset = 9$ μ m; with 8 or 9 bracts, their length = 9 μ m; capsule subspherical, $\emptyset = 5$ μ m. Relative lengths of flagella (base segments included): $F_1 = 100$, $F_2 = 49$, $F_3 = 83$. Length of base segments: $bs_1 = 22$, $bs_2 = 9$, $bs_3 = 16$ μ m. F_1 3.2 times as long as t , F_2 and F_3 1.7 and 2.9 times as long as s respectively. Calyces helmet-shaped, those of F_1 largest.

Trunk. Setae of collum segment furcate; main branch cylindrical, striate-annulate, secondary branch rudimentary, conical, pointed, glabrous; length of submedian ones = 25, lateral ones = 20 μ m; sternite process broad, anterior part divided into two rounded lobes separated by a shallow median incision; appendages short with thick round caps, $\emptyset = 20$ μ m.

Tergites with tuft-like setae with clavate stalk. Cuticle between setae with very small sessile organs in the centre of round glabrous spots surrounded by sparse but distinct pubescence. Pubescence longest on lateral parts of tergites.

Setae on outer margin of laterosternal furrows resembling tuft-like setae but with thinner axes, some anterior ones even pointed. All setae in inner row pointed and with shorter oblique pubescence.

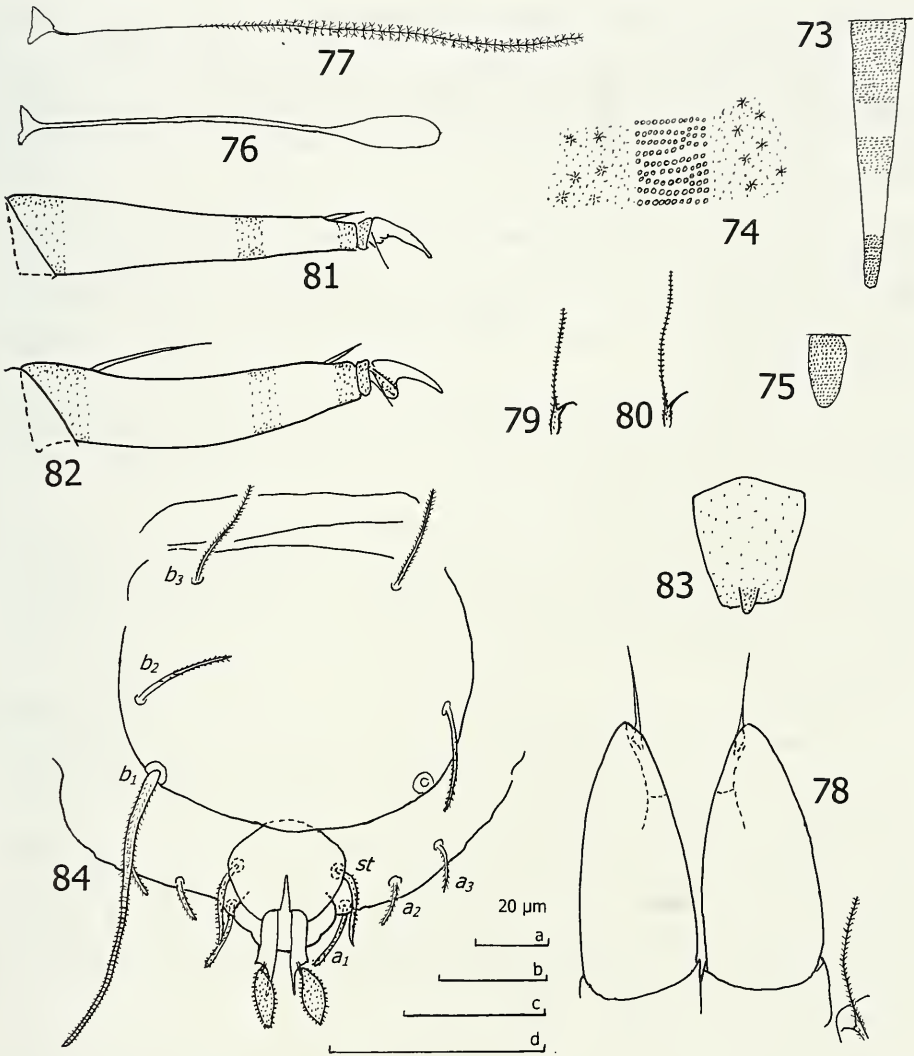


FIGS 65-72

Sphaeropauropus leongkiети sp. n., holotype, ad. 9 (♂). 65, head, median and left part, tergal view; 66, left antenna, sternal view; 67, collum segment, median and left part, sternal view; 68, tergite I, central part; 69, tergite I, near posterolateral corner; 70, tergite I, posterior margin; 71, tergite II, right laterosternal furrow, sternal view; 72, tergite VI, posteromedian margin, tergal view. Scale a: Figs 65, 67, 71; b: Figs 66, 68-70, 72.

Anteromedian part of tergite V with wedge-shaped area, provided with densely packed transverse bands of small circular spots. A similar but smaller area on anterior part of tergite VI.

Bothriotricha. All but T_3 with very thin axes and distinct pubescence, the latter erect on distal halves, hairs branched at least on T_5 . T_3 with thicker axes and distal ovoid swelling, its length 1/4 of length of bothriotrix; only distal part of T_3 with minute



FIGS 73-84

Sphaeropauropus leongkietii sp. n., holotype, ad. 9(♂). 73, tergite V, wedge-shaped cuticular pattern on anteromedian part; 74, detail of the cuticular pattern in Fig. 73 in higher magnification; 75, tergite VI, wedge-shaped cuticular pattern on anteromedian part; 76, T_3 ; 77, T_5 ; 78, genital papillae and seta on coxa of leg 2, anterior view; 79, seta on coxa of leg 9; 80, seta on trochanter of leg 9; 81, tarsus of leg 1; 82, tarsus of leg 9; 83, femur of leg 1 with appendage; 84, pygidium, sternal view. Pubescence only partly drawn in Figs 81 and 82. Scale a: Figs 73, 75; b: Figs 76-83; c: Fig. 84; d: Fig. 74.

but dense pubescence of oblique hairs. Relative lengths of bothriotricha: $T_1 = 100$, $T_2 = T_5 = 95$, $T_3 = 75$, $T_4 = 90$.

Genital papillae. Proximal half subcylindrical, distal half conical, length = 51, greatest $\varnothing = 22 \mu m$; length of seta = 20 μm . Papillae 2.6 times as long as greatest

diameter, seta 0.4 of length of papilla. Cuticle glabrous. Coxal seta of leg 2 as on leg 1, length = 27 μ m.

Legs. All legs 5-segmented. Setae on coxa and trochanter of leg 9 furcate. Main branch thin, striate-annulate, on coxa blunt and on trochanter pointed; secondary branch rudimentary, curved, pointed, glabrous. These setae on legs 1-8 of similar shape but coxal setae thinner.

Tarsi of leg 9 slender, tapering, somewhat bow-shaped, 4.1 times as long as greatest diameter, minutely pubescent; two tergal setae, both tapering, pointed, glabrous. Proximal seta = 22, distal seta = 8 μ m, proximal seta 0.3 of length of tarsus and 2.8 times as long as distal seta. No proximal seta on tarsus of leg 1. On anterior side of femur of leg 1 a triangular blunt appendage with short pubescence; length of appendage = 5 μ m.

All legs with almost straight main claw and small setose anterior secondary claw. Base of main claw with distinct pubescence, other parts glabrous. Main claw of leg 1 = 13, secondary claw = 8 μ m; main claw of leg 9 = 14, secondary claw = 9 μ m; main claw 0.2 of length of tarsus in all legs.

Pygidium. Tergum. Posterior margin rounded and with protruding lobe between a_1 . Setae subsimilar to each other, subcylindrical, curved inwards, with very short pubescence. a_1 , a_2 and a_3 cylindrical, blunt, converging; st tapering, directed posteriorly. Index of tergal setae: $a_1 = 9$, $a_2 = a_3 = 7$; $a_1 - a_1 = 16$, $a_2 - a_2 = 30$; $a_3 - a_3 = 50$, $st = 13$, $st - st = 14$ μ m; $st - st/a_1 - a_1 = 0.9$, $a_1/a_1 - a_1 = 0.6$, $a_1/a_1 - a_2 = 1.1$, $a_1 - a_1/a_2 - a_3 = 2.0$. Tergum glabrous.

Sternum. Posterior margin between b_1 evenly rounded, setae tapering, with short oblique pubescence or striate distally. Index of sternal setae: $b_1 = 43$, $b_2 = 15$, $b_3 = 16$, $b_1 - b_1 = 38$, $b_2 - b_2 = 43$, $b_3 - b_3 = 28$, $b_1 - b_2 = 11$ μ m; $b_1/b_1 - b_1 = 1.1$, $b_1/b_2 = 2.9$, $b_2/b_1 - b_2 = 1.4$, $b_3/b_3 - b_3 = 0.6$.

Anal plate pentagonal and with 2 cylindrical branches protruding backwards from posterior part of sternal side. Each branch with posterolateral-posterosternal truncation and two distal appendages: one of them tergal submedian and tapering, the other submedian and clavate. The latter 2.3 and 3.1 times as long as its greatest width and 1/3 of length of plate. Anal plate glabrous, clavate, with distinct erect pubescence.

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